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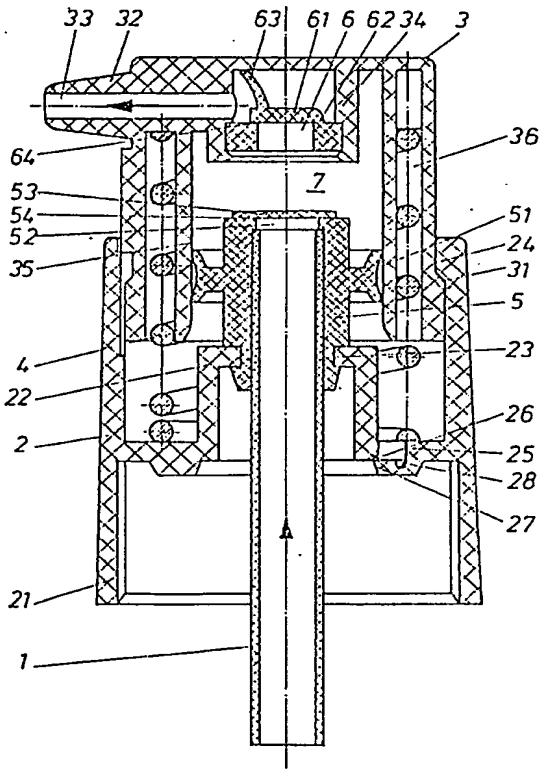
(54) A pump for dispensing metered amounts of fluids

(57) An economical pump for dispensing metered amounts of fluid which is easy to assemble is proposed, wherein a piston 3 – in the form of a push-button – is displaceable against a spring 4 in a housing 2 which is mountable on a ventilatable container. A metering chamber 7 is formed between the piston and a dividing wall 22 in the housing, which wall is horizontal i.e. perpendicular relative to the axis, and a reduced pressure is created in said metering chamber by piston movement. A riser tube 1 – capable of being shut-off by a first non-return valve 53 – extends, in use, from the container end into said metering chamber which is connected to an outlet in the piston via a second non-return valve 61. In such case, one-piece flap valves are proposed with a self-springing valve flap provided both in the piston and at the inlet of the riser tube leading into the metering chamber.



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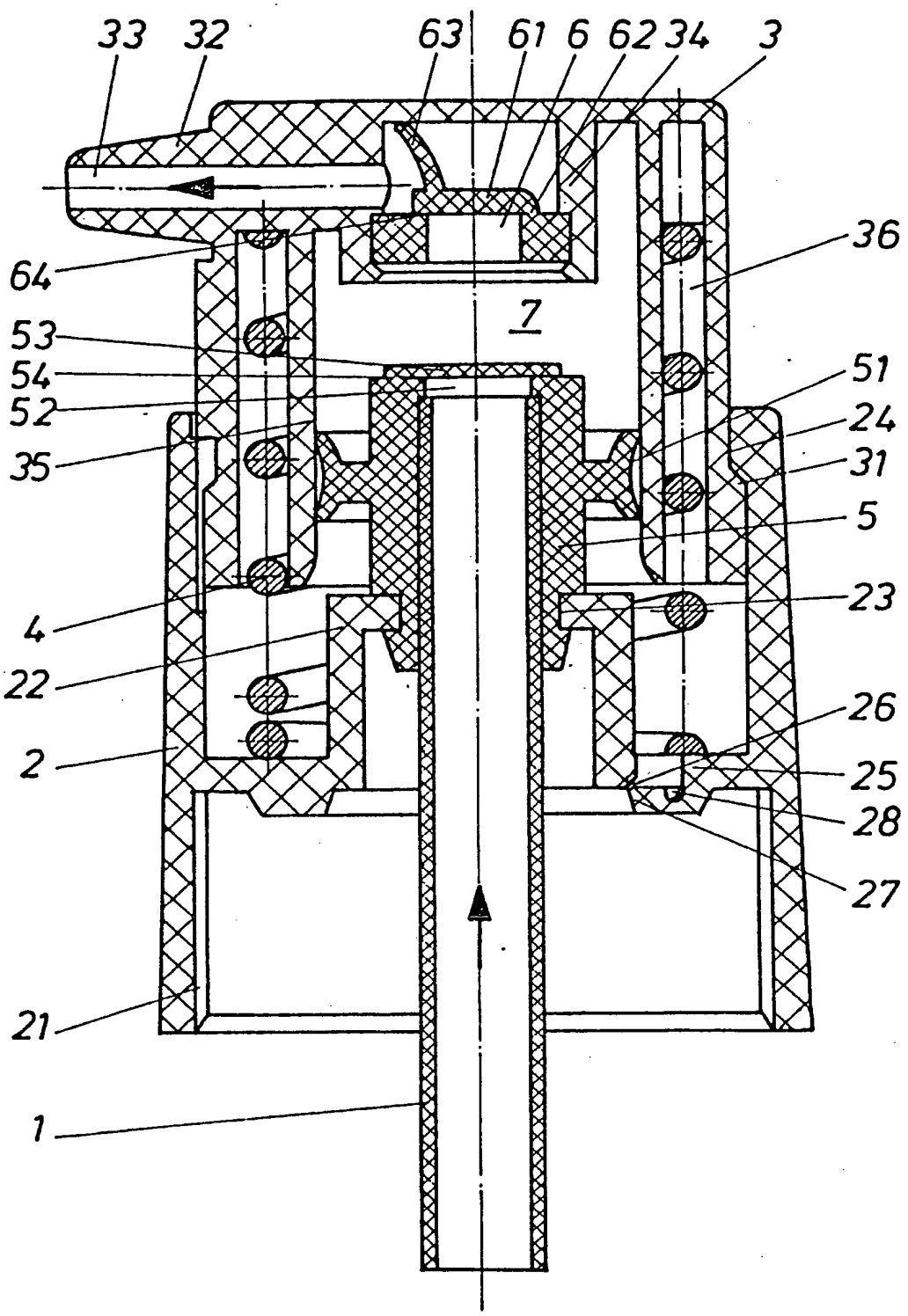
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SPECIFICATION

A pump for dispensing metered amounts of fluids

The present invention relates to a pump for dispensing metered amounts of fluids, wherein a piston - in the form of a push-button - is displaceable in opposition to a spring in a housing which is mountable, in use, on a ventilatable container, a metering chamber being formed between the piston and a dividing wall in the housing, a portion of which wall extends perpendicular relative to the axis, a reduced pressure acting upon said metering chamber by means of the piston movement, and a riser pipe - capable of being shut-off by a first non-return valve - extends from the container end into said metering chamber which is connected to an outlet in the piston via a second non-return valve.

Pumps of this type for dispensing metered amounts are known and comprise a plurality of individual components parts which take a long time to assemble. Pumps of this type are generally mountable on the containers of a pre-determined size which are full of the fluid to be delivered and the pumps dispense a pre-determined amount with each pump stroke. The metering chamber is reduced in size when the piston in the form of a push-button is depressed, thus causing the air or dispensing medium contained therein to escape outwardly via the non-return valve in the piston. By causing the piston to spring-back, a reduced pressure is produced in the metering chamber between the piston and dividing wall of the housing, so that a pre-determined metered amount flows into the metering chamber from the container, which is connected to the atmosphere, via the riser tube. This amount is conveyed outwardly with each depression of the piston. In known arrangements, non-return valves are provided both on the riser tube and in the piston, and such valves are formed from a spring-biassed ball.

Pumps of this type for dispensing metered amounts are mass-produced components which are used in connection with very varied types of containers. The costs for such components should therefore be kept as low as possible.

The invention seeks to considerably simplify the design of a pump of the above-described type for dispensing metered amounts so that less material and assembly work are required, whilst still achieving the same operability.

The object according to the invention is achieved with a pump of the above-described type which dispenses metered amounts of fluids and is characterised by a one-piece flap valve having a self-springing valve flap in the piston and by an additional one-piece flap valve at the inlet of the riser tube leading into the metering chamber.

Thus, according to the present invention there is provided a pump for dispensing metered amounts of fluids, wherein a piston in the form of a push-button is displaceable in opposition to a spring in a housing which is mountable on a ventilatable container, a metering chamber being formed between the piston and a dividing wall in the housing, which wall has a portion which extends relative to the central axis of the housing, a reduced pressure being creatable in said metering chamber by means of the piston movement, and a riser tube which is capable of being closed by a first non-return valve which tube in use extends from an end of the container into said metering chamber which is connected to an outlet in the piston via a second non-return valve; wherein said first non-return valve is a one-piece flat valve at the inlet of the riser tube leading into the metering chamber, and where said second non-return valve is a one-piece flap valve having a self-springing or resilient valve flap in the piston.

According to a preferred embodiment of the invention, such a pump is characterised by the second flap valve being inserted in an annular receiving means in the hollow piston and is disposed between the metering chamber and the dispensing tube wherein the valve flap is moulded on an annular valve seat with a resilient return film hinge and being supported, at its end remote from the valve seat, against the internal wall of the receiving means of the piston by means of a resilient web. In such case, a substantially cylindrical, one-piece moulded part which generally surrounds the first flap valve and is inserted in a bore formed in the dividing wall of the housing which defines the pressure or metering chamber, and lips are moulded with said moulded part, said lips providing a seal against the internal wall of the piston. In order to ensure that the container is constantly ventilated if a reduced pressure prevails therein, a non-return valve is provided by being integrally moulded in the dividing wall of the housing and ensures that there is a constant balance between the pressure in the interior of the container and the outside pressure.

The pump according to the invention for dispensing metered amounts of fluids comprises only a few individual component parts which can easily be produced as plastics material injection mouldings. They can be mounted with a relatively small amount of work, so that the costs of such a pump are considerably less than the cost for known pumps. The simple plastics material flap valves are of particular technical significance because they can be mounted easily in front of the riser tube by, for example, being splayed-out in the piston or in the moulded part. In such case, the valve flaps are self-springing or, in order to increase the resilience, are supported by moulded-on portions so as to be resilient in their casings.

A third valve is of particular importance to the invention and is moulded in the pump housing to ventilate the container. The valve is automatically closed when acted upon by the container fluid, for example, by rotating the container with the metering pump downwardly.

The pump according to the invention for dispensing metered amounts is suitable for use with many varieties of containers. It may, for example, be in the form of a screwed-on part. To be adapted to different feed amounts or feed media, only individual components ever need to be changed. Such a pump for dispensing metered amounts is especially intended for sufficiently viscous media.

The invention will be described further, by way of example, with reference to the accompanying drawing which is a cross-sectional view of a pump for dispensing metered amounts.

A housing 2 of a pump for dispensing metered amounts is sealingly screw-connectable, by means of an internal threaded portion 21 thereof, to a correspondingly threaded portion of the neck of a container (not shown). A piston 3 -in the form of a push-button having a double wall - is displaceable from above into the housing 2 in opposition to a spring 4. A shoulder 31 is moulded on the outside of the double wall of piston 3 and, when the piston is in its pushed-out position, as shown in the drawing, said shoulder 31 strikes against an internal collar 24 of the housing 2. The compression spring 4 is supported with one end on a portion of dividing wall 22 which is substantially perpendicular relative to the housing axis. The other end of spring 4 is accommodated in a chamber 36 formed between the double wall of the piston 3.

The piston 3 is hollow and is guided in the housing 2. The piston interior forms a metering chamber 7 having a lower seal (lips 51) which is secured on the housing, and a reduced pressure can be produced in said metering chamber 7.

A riser tube 1 extends from the container end into the chamber 7 and is sealed by a self-springing flap valve 52, 53. This flap valve is formed on a one-piece plastics moulded part 5 with a substantially cylindrical, hollow base member. The riser tube 1 is introduced through the coaxial bore and secured there. The self-springing valve flap 53 is moulded on this moulded part 5 with a resilient film hinge 54 at the bore aperture leading to the metering chamber 7, and said valve flap 53 is pressed against the valve seat 52. Two sealing lips 51 are moulded on the outside of the moulded part 5 and seal the metering chamber 7 at the internal wall 35 of the piston 3. The moulded part 5 is mounted and retained by its resilient nature in a bore 23 in the dividing wall 22 of the housing 2.

A second, one-piece flap valve is in the form of a valve insert member 6 and is retained by its resilient nature mounted in an annular receiving means on the piston 3. The metering chamber 7 is connected via the valve insert member 6 to bore 33 in a dispensing tube on the piston 3.

To ventilate the container (not shown) via the pump housing 2, an opening 25 is provided in the dividing wall 22 and forms a valve seat 26 against which a moulded-on valve flap 27 closes in the flow direction of the conveyed medium. The self-springing action of this valve flap is, in turn, achieved by the connecting reduced wall portion 28 which forms a type of film hinge.

When the piston 3 - in the form of a push-button - is depressed, air in the chamber 7 is compressed and the valve flap 53 is thereby closed; the valve flap 61 of the valve insert member 6 is raised from its valve seat 64; and air escapes outwardly through the bore 33 of feed-pipe 32.

When the compressed spring 4 is relieved, the piston 3 is again forced upwards and outward of the housing 2. Because of the resilient film hinge 62 and a moulded-on resilient or spring web 63 of valve flap 61, which web is supported against the piston wall, the valve flap 61 is pressed into its sealing position. This enables a vacuum or reduced pressure to be produced in the metering chamber 7 by movement of the piston 3.

Since fluid in the container is under atmospheric pressure, the fluid rises upwardly through the riser tube 1 because of the reduced pressure in the metering chamber 7, the valve flap 27 opens and a pre-determined amount of fluid enters the chamber 7.

When the piston 3 is depressed again, the amount of fluid in the chamber 7 is at least for the most part conveyed to the outside through the flap valve member 6 and the bore 53 of dispensing tube 32.

CLAIMS

1. A pump for dispensing metered amounts of fluids, wherein a piston (3) in the form of a push-button is displaceable in opposition to a spring (4) in a housing (2) which is mountable on a ventilatable container, a metering chamber (7) being formed between the piston (3) and a dividing wall (22) in the housing (2), which wall (22) has a portion which extends relative to the central axis of the housing (2), a reduced pressure being creatable in said metering chamber (7) by means of the piston movement, and a riser tube (1) which is capable of being closed by a first non-return valve (53,54) and which tube (1) in use extends from an end of the container into said metering chamber (7) which is connected to an outlet (32,33) in the piston (3) via a second non-return valve (6); wherein said first non-return valve is a one-piece flap valve (53,54) at the inlet of the riser tube (1) leading into the metering chamber (7), and where said second non-return valve is a one-piece flap valve (6) having a self-springing or resilient valve flap (61,62,63) in the piston 3.

2. A pump as claimed in claim 1, in which the flap valve (6) is inserted in an annular receiving means (34) in the hollow piston (3) and is disposed between the metering chamber (7) and a dispensing tube (32) forming the outlet of the piston; wherein the flap (61) of the valve is moulded on an annular valve seat (64) with a back-springing film hinge (62) and is supported, at its end remote from the valve seat, against internal wall of the receiving means (34) of the piston (3) by means of a resilient web (63).

3. A pump as claimed in claim 1, in which a substantially cylindrical, one-piece moulded part (5) surrounds the first flap valve (53,54) and is inserted in a bore formed in the dividing wall (22) of the housing (1), which part defines an end of the metering chamber (7), and lips (51) are moulded with said moulded part (5) and provide a seal against the internal wall (35) of the piston (3).

4. A pump as claimed in any one of claims 1 to 3, in which a non-return valve (25,26,27,28) is moulded in the dividing wall (22) of the housing (2) and serves to ventilate a container, which, in use, is connected to the pump when a reduced pressure prevails in such container.

5. A pump as claimed in claim 4, in which an

opening (25) is formed in the housing wall (22) and is sealed by a valve flap (27), provided with a self-springing reduced wall portion (28), in the flow direction of the fluid if excess pressure prevails in the feed direction.

6. A pump as claimed in claim 3, wherein the riser tube (1) is located into the plastics moulded part (5).

7. A pump for dispensing metered amounts of fluid substantially as herein described with reference to and as illustrated in the accompanying drawings.

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